Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183
	)	

REPLY COMMENTS OF COMSEARCH

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SUMMARY

Comsearch continues to support the Commission's efforts to ensure that there are adequate protections for incumbent 6 GHz users prior to and as a condition of allowing unlicensed use of the 6 GHz band. These protections must allow for continuous interference-free operation and growth for the many important services that rely on Part 101 microwave services. The record in this proceeding unequivocally shows that incumbent microwave users spanning the public safety and critical infrastructure sectors utilize the 6 GHz band to deliver a wide variety of essential services. It is imperative that such users continue to be able to provide such services with a high degree of reliability. The record also contains significant support for many of the Automatic Frequency Coordination ("AFC") proposals Comsearch suggested in its initial comments. Specifically, Comsearch reiterates that all 6 GHz unlicensed devices should be required to make use of the AFC system, incumbent microwave licensees should not shoulder the responsibility for identifying and mitigating interference from unlicensed devices, and underlying AFC data sets on incumbent systems must be accurate and complete.

Despite the strength of the record in this proceeding, Comsearch recognizes that many complex technical and operational issues remain outstanding which could be best addressed through a multi-stakeholder process hosted by a neutral organization such as the WInnForum. A multi-stakeholder approach would be the most efficient and effective way to sort out remaining questions with respect to propagation models, fade margins, building penetration loss, interference protection criteria, data update intervals, device power, location and registration, and AFC requirements. Finally, Comsearch encourages the Commission to further study and seriously consider CTIA's proposal to reallocate incumbent users of the 6.525-7.125 GHz band to the 7.125-8.4 GHz ("7/8 GHz") band.

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REPLY COMMENTS OF COMSEARCH

Comsearch, a CommScope company,[1] hereby files its reply comments in the above-captioned proceeding. As we explain in greater length below, the record in this proceeding shows that incumbent microwave licenses rely on access to the 6 GHz band to provide essential safety-of-life and critical infrastructure services and must be allowed to continue doing so with a high degree of reliability of service. Moreover, the record contains substantial support for adoption of many of the Automatic Frequency Coordination ("AFC") rules Comsearch suggested in its initial comments to protect incumbent service operations while enabling unlicensed operations in the 6 GHz band. Notwithstanding the robust record that has been developing, Comsearch recognizes that many complex technical and operational issues remain outstanding which could be best addressed through a multi-stakeholder process hosted by a neutral organization such as the WInnForum. Furthermore, Comsearch encourages the Commission to

[1] Comsearch is a business unit within the Integrated Solutions/CommScope Mobility Solutions division of CommScope (NASDAQ: COMM). CommScope helps companies around the world design, build and manage their wired and wireless networks. Our vast portfolio of network infrastructure includes some of the world's most robust and innovative wireless and fiber optic solutions. Our solutions can be found in the largest buildings, venues and outdoor spaces; in data centers and buildings of all shapes, sizes and complexity; at wireless cell sites; in telecom central offices and cable headends; in FTTx deployments; and in airports, trains, and tunnels.

further study and consider CTIA's proposal to reallocate incumbent users of the 6.525-7.125 GHz band to the 7.125-8.4 GHz ("7/8 GHz") band.

I. Microwave Systems Support Safety-of-Life and Critical Infrastructure Operations and Must Be Thoroughly Protected

The record in this proceeding is replete with filings from users and owners of microwave systems discussing the nature of their use and the importance of maintaining existing reliability levels. Microwave operators and users from across the public safety, critical infrastructure, and telecommunications sectors have submitted comments on this proceeding detailing the critical nature of their communications, the requirement for high-reliability communications, and the harmful impact of interference on the American public. Below are just a few examples:

Electric Power and Utilities

> "Communication impairments or outages result in loss of protection and control of critical electric infrastructure. Such impairment can lead to localized blackouts and damage to distribution systems, which may… have severe economic impacts."

Joint comments of Tucson Electric Power Company, and its affiliate, UNS Electric, Inc.[2]

Oil and Gas Pipelines

> "…the *Coalition's* oil and gas member companies use SCADA systems to support telemetry and pipeline measurement data systems… SCADA… includes data for well site safety and event notification which ensures quick response to environmental and life critical events. SCADA systems also provide water gathering system line balancing to control flow and pressure… and… support oil and gas pipeline valve, pump, and compressor controls at compressor stations... These functions rely on constant, seamless communications networks supported by fixed 6 GHz microwave links."

Comments of the Critical Infrastructure Coalition.[3]

[2] TEP 6 GHz Comments at 8.

[3] CCI 6 GHz Comments at 5.

Public Safety

> "ITA [Information Technology Agency] maintains 6 GHz data links to provide backhaul for police, fire, and EMS communications and dispatch. Nearly 10,000 Los Angeles Police Department officers, and thousands of Los Angeles Fire Department firefighters and other first responders, rely every day on 6 GHz links maintained by ITA. An example of the demands the Band supports for just the Los Angeles Fire Department would include providing a response to more than 400,000 calls annually."

Comments of The City of Los Angeles.[4]

Railroads

> "[T]hese microwave links relay critical data regarding train signals and remote switching of tracks and routing of trains through rights-of-way, depots, and freight yards, as well as telemetry from trackside detectors and communication base stations located throughout the network… These systems can then relay actionable information to dispatchers and ultimately crew members, who can then take the necessary actions. These 6 GHz band microwave systems also are vital to coordination of operations among the different railroads."

Comments of the American Association of Railroads.[5]

Telecommunications

> "AT&T alone holds 8,138 licenses in this band used to operate thousands of microwave links. These links, in addition to providing backhaul for its wireless network and main telecommunications links for its landline network, will be utilized to support its roll-out of FirstNet—a public/private partnership in which AT&T is contractually committed to the U.S. government to ensure high levels of reliability for its public safety operations."

Comments of AT&T.[6]

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[4] City of Los Angeles 6 GHz Comments at 5 (further stating that "ITA also provides 6 GHz mobile connectivity to law enforcement aviation units. This use of the Band permits distribution of real-time video from the City's aviation units to law enforcement personnel on the ground, saving lives and property. Finally, one of the unique challenges ITA faces in supporting its public safety customers is the sheer size of the City of Los Angeles. Officers and firefighters across the City must be able to rely at all times on their communications – downtime, or interference, are simply unacceptable when lives are at stake. And as the City continues to grow, and prepares to host the Super Bowl in 2021 and the Olympics in 2028, any disruption to essential public safety systems is the last thing the City needs, and interference is the last thing these systems can tolerate.").

[5] AAR 6 GHz Comments at 3.

[6] AT&T 6 GHz Comments at 7.

The 6 GHz bands are now the workhorse bands for backhaul connecting an overwhelming amount of America's public safety, critical infrastructure, telecommunications and other services. The Commission must ensure that the entrance of unlicensed devices into this band assures these systems suffer no degradation in operation.

II. The Record Supports Adoption of Well-Crafted AFC Rules that Adequately Protect Incumbents

There is wide support in the record for the primary proposals Comsearch set forth in its initial comments. In particular, Comsearch reiterates that all 6 GHz unlicensed devices should be required to make use of the Automated Frequency Coordination ("AFC") system, incumbent microwave licensees should not be required to identify and mitigate interference from unlicensed devices, and underlying AFC data sets on incumbent systems must be accurate and complete.

We note that RLAN proponents are still using the RKF study to argue that unlicensed devices can effectively share with FS microwave systems.[7] In their comments, the FWCC persuasively rebutted most of the ill-informed assertions from the RKF study. Specifically, the FWCC exposed weaknesses in study's analysis:

- Inappropriate use of propagation models typically used for mobile coverage[8]
- Inappropriate use of clutter models that predict average values[9]
- Erroneous assumption of times when multipath fading occurs ("midnight to 8 am")[10]

[7] RLAN Consortium 6 GHz Comments at 14.

[8] FWCC 6 GHz Comments at 23.

[9] *Ibid*.

[10] *Id*. at 15-18.

- Averaging a building penetration loss value for all indoor cases and not accounting for the low-loss cases (e.g. rooftops, balconies, windows, etc.)[11]
- RLAN height distribution (assigning virtually all RLANs to heights less than that of a 3-story building)[12]

We also note that RKF suggests the median fade margin is 50.8 dB.[13] However, our comments show that it is in fact a mean of 38 dB with 90% in the range 30 to 46 dB.[14] Further, the RLAN Consortium proposes that an I/N = 0 dB interference criterion is adequate. However, to protect the microwave receiver fade margins as designed the criterion must be I/N=-6 dB or lower.[15] In considering the technical analysis of the proposed entry of unlicensed devices into the 6 GHz band, we urge the Commission to give great weight to the comments and feedback from those parties with extensive experience engineering, deploying and operating microwave systems.

Many commenters recognized that in order to prevent interference into licensed incumbent microwave services, the Commission should require all unlicensed devices operating in the 6 GHz band to use an AFC system.[16] AT&T observed that "even indoor RLAN devices may potentially cause harmful interference with licensed operations with the proposed power limits."[17] Similarly, the Fixed Wireless Communications Coalition ("FWCC") noted that

[11] *Id*. at 18.

[12] *Id.* at 29.

[13] RFK Study at 49.

[14] Comsearch 6 GHz Comments at 21.

[15] *Id*.

[16] *See, e.g.*, AT&T 6 GHz Comments at 18-19; Tuscon Electric Power Company 6 GHz Comments at 14; Federated Wireless 6 GHz Comments at 6; NPSTC 6 GHz Comments at 11; City of Austin Comments at 3.

[17] AT&T 6 GHz Comments at 18-19.

"RLANs used indoors even at low power can cause interference… [and] attenuation from building walls may be insufficient to block the signal."[18] Comsearch shares CTIA's view that "the AFC should apply to all access points" and that "if the cost of designing and manufacturing indoor access points increases as a result of the AFC requirements, this is simply the nature of the requirement that unlicensed devices not cause harmful interference to licensed services."[19]

The record also contains significant support for the proposition that responsibility for identifying and mitigation interference from unlicensed devices should not fall on the shoulders of incumbent licensees.[20] Comsearch agrees with Southern Company that "it is unfair to licensed users to put them in the position of enforcing secondary operating rights against consumers, and it is inequitable to expect them to take on this policing activity with no means of being reimbursed."[21] Comsearch also shares AT&T's view that "any proposals that address integrating unlicensed use into the 6 GHz band must propose a technical solution to detect, locate, and resolve interference as rapidly as possible."[22] However, as the Association of American Railroads recognized, "[a]ll costs associated with deployment of the AFC should be borne solely by the RLAN industry."[23]

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[18] FWCC 6 GHz Comments at 10.

[19] CTIA 6 GHz Comments at 20.

[20] *See* AT&T 6 GHz Comments at 18; UTC 6 GHz Comments at 16; Association of American Railroads 6 GHz Comments at 14; CTIA 6 GHz Comments at 17.

[21] Southern Company 6 GHz Comments at 20.

[22] AT&T 6 GHz Comments at 18.

[23] Association of American Railroads 6 GHz Comments at 14.

Furthermore, a substantial number of commenters echoed Comsearch's concern that AFC data sets on incumbent systems must be accurate and complete.[24] For instance, FWCC observes that "[w]hile ULS is reasonably accurate and complete as to transmitter information, its receiver data are not as good. A system that protects the wrong receiver types at the wrong locations will leave the actual receivers wide open to interference." Comsearch agrees with CTIA that beyond merely relying on ULS, the AFC should be required to "verify the information using a third-party database to protect incumbent service licensees from harmful interference at the hands of unlicensed devices."[25]

In recognition of the data inaccuracies found in the ULS, the RLAN Consortium (Apple, Broadcom, Cisco, etc.) proposed a "generous" "amnesty window" "in which 6 GHz FS licensees could correct erroneous or incomplete FS link registration data without penalty or fee."[26] However, in the Consortium's view, after the closure of said window, interference would be deemed to be due to the licensee's own failure to provide correct registration information and absolving the interfering Part 15 device and user from all responsibility for interference arising from the erroneous database information. This represents a deep misunderstanding of the frequency coordination process and the attendant role of commercial databases. While Comsearch makes extensive use of ULS in its myriad coordination operations, as the company explained in its initial comments,[27] unlicensed device interests do not recognize or account for the fact that ULS has many limitations that are not within the control of licensees. For example,

[24] *See, e.g.*, AT&T 6 GHz Comments at 19; FWCC 6 GHz Comments at 28-32; Intelsat 6 GHz Comments at 13; NAB 6 GHz Comments at 14; Southern Company Comments at 14; CTIA Comments at 18; SBE Comments at 4.
[25] CTIA Comments at 18.

[26] RLAN Consortium 6 GHz Comments at 42.

[27] Comsearch 6 GHz Comments at 17.

ULS data frequently lags behind the Part 101 frequency coordination process in displaying proposed operation of microwave links, and the sheer volume of microwave filing and coordination activity is sufficiently high to require frequent (at a minimum daily) checks.[28] ULS can also be susceptible to external circumstances that undermine the reliability of the database.[29] Moreover, ULS does not provide antenna parameters nor detailed radio data to inform a more accurate AFC analysis. In light of such functional limitations, Comsearch advises against adopting the rigid and needlessly draconian amnesty window proposal set forth by the RLAN Consortium.[30]

III. As it has Done in Prior Proceedings, the FCC Should Empower Multi-Stakeholder Organizations to Resolve Remaining Open Issues

As a general matter, Comsearch recognizes that many outstanding issues remain that have yet to be fully resolved within the course of this proceeding. Important work remains to be

[28] In fact, due to the number of microwave systems being coordinated and licensed on a monthly basis, coordination databases (such as those maintained by Part 101 frequency coordinators like Comsearch) contain data on microwave systems seeking conditional authorization, which allows applicants to go into operation upon application submittal pending formal license grant. Comsearch understands from its customers that they regularly put links into service under conditional authorization within a short time after application filing – sometimes within a day. Links operating under conditional authorization are entitled to and must receive full protection from unlicensed transmitters. AFC checking by unlicensed devices only on a monthly basis as proposed by the RLAN Consortium is wholly inadequate – the AFC must be checked at least daily, if not more frequently, to ensure unlicensed transmitters adjust their operations to protect filed links.

[29] As Comsearch pointed out in its initial comments, "during the latest government shutdown, no license or equipment data was updated in the ULS during the majority of the shutdown period, yet new microwave paths were allowed to use conditional authorizations and initiate service upon application submittal. If the AFC system were operational and relying on the ULS, it would be missing this information and unlicensed device interference to microwave services would have been highly likely." Comsearch 6 GHz Comments at 17.

[30] RLAN proponents provide affidavits from someone familiar with Fixed Service operations and Pt. 101 frequency coordination. The affidavits belie an understanding or experience with designing, engineering, coordinating deploying, and operating high-capacity/high-reliability 6 GHz microwave systems. For example, using Fresnel Zone clearance as an argument that RLAN devices will not be in the main beam is thoroughly disproved by our Aug. 24, 2018 ex parte filing. In addition, as indicated herein, the ULS has significant deficiencies to be relied upon by an AFC to protect fulsome deployment and interference-free operation of 6 GHz microwave systems. We suggest the Commission defer to well known microwave experts and companies with substantial 6 GHz frequency coordination experience when addressing the technical nature of microwave system design and operation.

done on issues such as propagation models, interference protection criteria, the general AFC framework, device security, the applicable spectrum sharing framework and criteria, collaborative testing, and interference determination, reporting, mitigation, and resolution. As we explain at greater length in Section III below, Comsearch believes that the optimal forum for resolving such issues would be a multi-stakeholder organization.

As we explain below, the Commission has had a long history of successfully empowering multi-stakeholder bodies to sort out highly technical and/or contentious operational details in similar proceedings. Comsearch encourages the Commission to utilize the multi-stakeholder approach in the 6 GHz proceeding to address outstanding issues with respect to AFC standards development and believes that a neutral organization such as the WInnForum would be well equipped to effectively convene interested parties.

The record shows general acceptance that some form of spectrum sharing may be possible between unlicensed devices and incumbents in the 6 GHz band,[31] but there is broad disagreement on how and with which devices. More work is needed on the technical and process details, specifically: propagation models, fade margins, building penetration loss, interference protection criteria, data update intervals, device power, location and registration, and AFC requirements.

Comsearch believes that this work should not be done in the context of this rulemaking proceeding through competing filings. Rather, the Commission should consider using a multi-stakeholder group ("MSG") where these technical and detailed operational issues can be discussed among the appropriate experts with greater freedom to exchange ideas, information,

[31] *See, e.g.*, Verizon 6 GHz Comments at 3; HP 6 GHz Comments at 2-3; NCTA 6 GHz Comments at 2; Federated Wireless 6 GHz Comments at 3; WISPA 6 GHz Comments at 1.

and concerns without the rigidity of the Commission's filing rules and with appropriate protections for proprietary information. We are confident that with the proper agreement and understanding of the missions of such an MSG, interested parties can arrive at a consensus approach on these complex issues in an efficient frame. We note there is broad consensus among commenters that the multi-stakeholder approach has merit.[32] Furthermore, this approach is consistent with the Commission's previous successes in leveraging MSGs in the proceedings considering the LightSquared proposal, TV white spaces, and Citizens Broadband Radio Service ("CBRS"). In 2011, the FCC established a multi-stakeholder working group bringing together LightSquared and a diverse set of GPS constituencies to resolve concerns about potential interference to GPS before LightSquared could commence offering commercial service pursuant to a waiver on its L-band MSS frequencies.[33] The Commission recognized that the multi-stakeholder approach could foster an environment "in which cooperative and candid discussions can ensue, and where information, including proprietary information, can be shared among the participants with appropriate measures in place to protect the confidentiality of that information."[34]

In the TV white spaces context, the white space database providers formed the White Space Database Administrators Group to establish and maintain a database interoperability specification, support development of a device to database API specification, and address

[32] *See, e.g.*, Midcontinent Communications 6 GHz Comments at 7; AT&T 6 GHz Comments at 20; Federated Wireless 6 GHz Comments at 9-11; WISPA 6 GHz Comments at 19-20; WInnForum 6 GHz Comments at 2-3; Public Interest Orgs 6 GHz Comments at 25.

[33] LightSquared Subsidiary LLC, Order and Authorization, 26 FCC Rcd 566, 586 (IB 2011).

[34] *Id*.

technical and operational issues.[35] The WS DBA Group worked effectively together and created database interoperability specifications and channel calculation guidelines that all of the group's member companies agreed to follow in order to ensure protection of incumbent operations in the TV bands.[36]

In the CBRS context, the Wireless Innovation Forum successfully convened all relevant stakeholders to develop the standards governing interfaces between the Spectrum Access System ("SAS") and CBRS devices, interfaces between SASs, communications security, professional installation of CBRS devices, and other aspects of CBRS operations.[37] When the FCC initially proposed the use of MSGs for CBRS, it noted that it was doing so at the recommendation of the Technological Advisory Council ("TAC"),[38] which had recommended the multi-stakeholder approach based on its numerous recognized advantages, such as the fact that "MSHs tend to be more flexible than traditional rulemaking bodies…, that getting a group of technically-minded, interested participants together to work on a specific issue often fosters a more collegial atmosphere conducive to collective problem solving, and that many MSHs use consensus-based decision making, which gives the decisions a powerful claim to legitimacy."[39]

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[35] *See* Report of the White Space Database Administrator Group, In re Unlicensed Operation in the TV Broadcast Bands, ET Docket Nos. 04-186 and 02-380 (filed Oct. 7, 2011).

[36] *Id*, pp. 2-3.

[37] *See* Wireless Innovation Forum, "Release 1 of the Baseline Standard Specifications," *available at* https://cbrs.wirelessinnovation.org/release-1-standards-specifications.

[38] *See 2014 CBRS FNRPM*, GN Docket No. 12-354, 29 FCC Rcd 4273, 4300.

[39] *See* FCC Technological Advisory Council, Receivers and Spectrum Working Group, Interference Limits Policy - The Use of Harm Claim Thresholds to Improve the Interference Tolerance of Wireless Systems, *White Paper* (February 6, 2013) (TAC *White Paper*), pp. 61-62, *available at*: http://transition.fcc.gov/bureaus/oet/tac/tacdocs/WhitePaperTACInterferenceLimitsv1.0.pdf.

In its *2015 CBRS Report & Order*, the Commission stated that "a multi-stakeholder group focused on the complex technical issues raised by this proceeding could provide us with a wealth of valuable insights and useful information."[40] However, the Commission explicitly declined to "take a position on the exact scope, makeup, or organizational structure of any such working group."[41] Ultimately, this hands-off approach paid off and the WInnForum's Spectrum Sharing Committee emerged as a viable convener for the development of CBRS operational and functional requirements, security requirements, protocol specifications, testing, certification, and operations.[42]

Comsearch believes that a *bona fide* and neutral multi-stakeholder group would provide the best avenue for resolving outstanding complex technical and organizational issues such as propagation models, interference protection criteria, the AFC framework, security requirements, sharing framework and criteria, collaborative testing, interference determination, reporting and mitigation, and resolution. Moreover, Comsearch reiterates its belief that the WInnForum may be a worthy multi-stakeholder body to foster the development of robust AFC technical standards and operating protocols. Given that the WInnForum has prior experience successfully navigating standards development in the highly complex CBRS context, the group would be well-equipped to help iron out the coordination and operational issues for AFCs in the 6 GHz band.

IV. Further Study of CTIA's Proposal is Needed to Determine the Viability of Reallocating the Upper 6 GHz Incumbents to the 7/8 GHz Band

[40] 2015 CBRS Report & Order, GN Docket No. 12-354, 30 FCC Rcd 3959, 4080, 4081.

[41] *Id*.

[42] *See* https://cbrs.wirelessinnovation.org/about.

Broadly speaking, Comsearch generally supports efforts to make additional spectrum available for mobile use.[43] With that said, the Commission should not proceed with such a course of action unless and until it has conducted an exhaustive review of targeted bands and determined that it is possible to develop a viable and effective mechanism for coordination and sharing with federal users.

Comsearch is open to the CTIA proposal insofar as the company believes that the 7/8 GHz band, under the right conditions, could potentially provide a home for displaced 6 GHz systems and provide additional bandwidth. Comsearch recognizes that a significant amount of work must be done before the Commission can make a determination on the viability of such a relocation. Amongst other considerations, Comsearch believes that the Commission will have to account for the following:

- How congested are the Upper 6 GHz and 7/8 GHz bands?
- Is there sufficient spectrum available to accommodate existing and future planned systems in the 7/8 GHz band?
- Is there ample equipment available in these bands?
- Would the transition to the 7/8 GHz band result in a comparable or better system?
- Are there technical specifications in place?
    - If so, what are the interference protection criteria and how will they be implemented?
- How can the Commission ensure that there is a seamless and efficient coordination process and what governmental involvement will be necessary?
- If the Commission adds a non-Federal allocation for the 7/8 GHz bands, will commercial systems hold co-primary status or will they be secondary users?
- What classified systems operate in these bands?

[43] *See* CTIA 6 GHz Comments, pp. 10-16.

Comsearch urges the Commission to account for the aforementioned issues and expects that such details will be worked out in a complementary rulemaking proceeding. We look forward to contributing our views and expertise on these important issues.

Respectfully submitted,

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